

ADIKAVI NANNAYA UNIVERSITY:: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY

Pre-PhD course work syllabus::2019 onwards

Paper-I: Recent Advances in Geological sciences and Research Methodology

Unit 1: Types of research- Process of Research-Formulation of objectives. Hypothesis to theory – geological example: Continental drift hypothesis to plate tectonics theory.

Dos and Don'ts for selecting a research problem. Importance of problem in National and International scenario, how to conduct research survey (books, journals, electronic search engines like Google, SCOPUS, Wikipedia Research-gate, IGCP Project Data Base, etc.). Research plan and its components

Unit 2: Methods of research (Survey, observation, case studies, experimental, historical and comparative methods) Methods of Literature collection, Experimental design, planning and execution of investigation. Methods of sampling, and analytical techniques: Collection of air, water, soil and rock samples.

Preparation of samples for microscopic examination and chemical analysis, Analytical Techniques viz. AAS, XRF, SEM, ICP, EPMA, Mass Spectrometry and Portable analytical techniques.

Unit 3: Analysis of numerical data – Central tendencies, dispersion, testing significance of variations, analyzing correlation of variables. Regression analysis, Principal Component Analysis, Factor Analysis, and Cluster Analysis and its use in geological research.

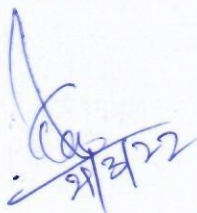
Application of Remote sensing & GIS in Geosciences.

Unit 4: Writing of Research proposal, Report and Research paper, Meaning and types – stages in preparation-characteristics-structure-documentation, foot notes and bibliography - Editing the final draft-Evaluating the final draft-checklist for a good proposal/reporter/research paper.

Unit 5: Research ethics – ethical issues, ethical committees; Publication Ethics, Scholarly publishing – IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

Text books

1. Research Methodology_ Methods and Techniques-New Age Publications (Academic)- C.R. Kothari - (1985)
2. Statistics and Data Analysis in Geology (3rd edition)-Wiley - John C. Davis - (2002)
3. Research Methodology in Geology by Arnold Luwang Usham
4. Research Methodology, Pearson edition, New Delhi - Rajit Kumar, (2005)
5. Higher Education Research Methodology A Step-by-Step Guide to the Research Process (1st Ed), Ben Kei Daniel and Tony Harland, Routledge publishers, 2018.
6. Manual for Research and Publication Ethics in Science and Engineering, Eun Seong Hwang, Eun Hee Cho, Young-Mog Kim, Kibeom Park, Wha-Chul Son, Tae-Woong Yoon, Jeong Mook Lim, Korean Federation of Science and Technology Societies publication, 2016
7. How to get a Ph D, UBS publishers & Distributors, New Delhi - Philips E M & Pugh D.S., (1998)
8. Marketing Research, Text and Cases, Mc Graw Hill, Rajendra Naragundkar (2008)


9/2/22

Model Question Paper

ADIKAVI NANNAYA UNIVERSITY:: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY

Pre-PhD Examination::2019

Paper-I: Recent Advances in Geological sciences and Research Methodology

Time: 3Hrs

Max. Marks: 100

Answer all the questions

1. Discuss in detail note on conducting research Survey ?

OR

2. Write about types of research, research process and formulation of objectives ?

3. Give in detail on methods of research and literature collection ?

OR

4. Describe the microscopic examination and chemical analysis of rock samples ?

5. Write about the Principal component analysis ?

OR

6. Give a detail note on application of remote sensing and GIS in mineral exploration ?

7. How do you write a research proposal and research paper ?


OR

8. Describe the methods used in correcting and editing of the report/proposal in finalization ?

9. Discuss the research ethical issues and publication Ethics ?

OR

10. Give a detail note on importance of plagiarism in research ?


21/3/22

ADIKAVI NANNAYA UNIVERSITY:: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY

Pre-PhD course work syllabus:: 2022

Paper-II: Groundwater studies and impact of urbanization (R. Bharat Kumar)
(Area of Research and methodology)

Unit 1: Groundwater: Occurrence and movement of groundwater, types of aquifers, groundwater levels, Types of wells – Methods of artificial groundwater recharge, Site selection criteria for artificial recharge - Groundwater assessment and management methods – Seawater intrusion in coastal aquifers – Land subsidence – Optimal groundwater development – Indian GEC norms.

Unit 2: Aquifer parameters: Determining aquifer parameters for unconfined, leaky and non-leaky aquifers – Determination of well characteristics and specific capacity of wells – Investigation and evaluation of Groundwater: geophysical methods – Electrical Resistivity method – GPR techniques – surveying procedure and Interpretation of data – Subsurface investigations – Test drilling – Resistivity logging.

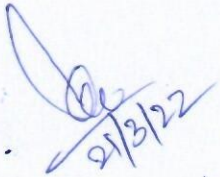
Unit 3: Fluvial geomorphology: Fluvial processes – Fluvial landforms – types – evolution of fluvial landforms. Morphometric analysis of Drainage pattern - Watershed delineation and codification – watershed characteristics – linear, aerial and relief aspects and slope analysis. Groundwater Quality assessment – Quality of groundwater for agriculture, drinking and industrial purposes -.Groundwater pollution.

Unit 4: Water resources in East and West Godavari districts: Godavari river basin and its tributaries – Rainfall distribution and run-off, Geology and Structure and geomorphological landforms in Godavari districts of Andhra Pradesh, Status of Groundwater resources in Godavari districts. Delta areas of India and special emphasis on Godavari and Krishna delta area.

Unit 5: Applications of Remote Sensing and GIS for classification of landuse/landcover in urban areas, identification of groundwater potential zones, pollution zones and Paleo-channels. Groundwater problems in coastal zones and delta areas. Groundwater prospective mapping methodology with Case studies. *Urbanization - effects of urbanization on hydrology, drainage morphometry and river basins - Effects of urbanization on groundwater quality, Sustainability of water quantity and quality within the urban water cycle, Restoration of streams in urban areas,*

Text books:

1. P.S.Roy, R.S.Diwedi and D.Vijayan (2010), Remote sensing applications, NRSC, Hyderabad
2. Chow V.T., Maidment D.R., Mays L.W., (1995): Applied Hydrology, Mc Graw Hill publ.
3. Rangunath H.M., (1994): Hydrology, Wiley Eastern Ltd., New Delhi, 1994.
4. Ven Te Chow, Hand book of Hydrology, McGraw Hill Publications, New York, 1995.
5. Groundwater geophysics – A tool for hydrogeology, Reinhard Kirsch, Springer verlag, 2006
6. Groundwater in Urban Areas, by Barry J. Hibbs (2017): <https://doi.org/10.1111/j.1936-704X.2016.03226>.
7. Scott J. McGrane (2016) Impacts of urbanization on hydrological and water quality dynamics, and urban water management: a review, Hydrological Sciences Journal, 61:13, 2295-2311, DOI: 10.1080/02626667.2015.1128084
8. Coates D.R. (1984) Urban geomorphology. In: Finkl C. (eds) Applied Geology. Encyclopedia of Earth Sciences Series, vol 3. Springer, Boston, MA.
9. Kupriyanov, V.V. 2009. Urban hydrology. In: The Hydrological Cycle, Volume III, The Encyclopedia of Life Support Systems, I.A. Shiklomanov (Ed.). pp. 141– 160.


21/3/22

Model Question Paper

ADIKAVI NANNAYA UNIVERSITY:: RAJAHMUNDRY

DEPARTMENT OF GEOLOGY

Pre-PhD Examination::2022

(Area of Research and methodology)


Paper-II: Groundwater studies and impact of urbanization (R. Bharat Kumar)

Time: 3Hrs

Max. Marks: 100

Answer all the questions

1. Give a detail note on Occurrence and movement of groundwater ?
OR
2. Discuss the seawater intrusion in coastal zones ?
3. Explain the aquifer parameters determination methods for various aquifers ?
OR
4. Explain the groundwater exploration techniques ?
5. Discuss the fluvial processes and fluvial landforms ?
OR
6. Give a detail note on morphometric analysis of drainage pattern in a river basin ?
7. Discuss the rainfall distribution and run-off conditions in Godavari districts of Andhra Pradesh
OR
8. Explain the Geomorphology of Godavari districts, Andhra Pradesh ?
9. Discuss the application of RS and GIS in Groundwater potential zones identification?
OR
10. Give a detail note on effects of urbanization on drainage morphometry and river basins ?


21/3/22

ADIKAVI NANNAYA UNIVERSITY, RAJAHMUNDRY
DEPARTMENT OF GEO SCIENCES
Pre Ph.D Examination -2022
Syllabus

**Paper - II: MAPPING OF SALT WATER INTRUSION ALONG THE COASTAL AQUIFERS
OF KALINGAPATNAM, ANDHRA PRADESH, INDIA BY AN INTEGRATED
APPLICATION OF REMOTE SENSING AND GEO-SPATIAL TECHNIQUES**

(KANDI SAI KIRAN)

UNIT-I: Origin of Water - Hydrologic cycle; Hydrological properties of rocks, Porosity, Specific yield, Specific Retention, Hydraulic Conductivity, Storativity, and Transmissivity; Vertical Distribution of Ground Water - Types of Aquifers, Unconfined, Confined, Semi - Confined & Perched – Springs.

UNIT-II: Darcy's law and its Application, Types of wells – Methods of artificial groundwater recharge, Site selection criteria for artificial recharge, Groundwater assessment and management methods. Types of drilling methods.


UNIT-III: Geomorphology: Fluvial processes – Fluvial landforms – types – evolution of fluvial landforms, coastal landforms. Physical and Chemical properties of groundwater, water Quality criteria for domestic, irrigation and industrial uses; Sources of pollution.

UNIT-IV: Sea water intrusion and its controls, methods of sea water intrusion, Effects of urbanization on groundwater quality, Sustainability of water quantity and quality within the urban water cycle, Restoration of streams in urban areas.

UNIT-V: Remote sensing: Applications of Remote Sensing and GIS for classification of identification of groundwater potential zones, pollution zones and Paleo-channels, Groundwater problems in coastal zones and delta areas.

TEXT BOOKS:

1. Todd, D.K. John Wiley & Sons. New York. Ground water Hydrology
2. Raghunath H.M., (1994): Hydrology, Wiley Eastern Ltd., New Delhi, 1994.
3. Thornbury, WS, Principles of geomorphology, wiley eastern, New Delhi
4. Richard John Huggett, Routledge (Taylor Fundamentals of geomorphology 3rd Ed. (2011) publishers.
5. M. Anji Reddy, BS publications, Geoinformatics for environmental management.


Dr. K. NOOKA RATNAM
Research Supervisor
Department of Geosciences
ADIKAVI NANNAYA UNIVERSITY
RAJAMAHENDRAVARAM-533 236.

ADIKAVI NANNAYA UNIVERSITY: RAJAHMUNDRY
DEPARTMENT OF GEO SCIENCES
Pre-PhD Examination: 2022
Model Question Paper

**Paper - II: MAPPING OF SALT WATER INTRUSION ALONG THE COASTAL AQUIFERS
OF KALINGAPATNAM, ANDHRA PRADESH, INDIA BY AN INTEGRATED
APPLICATION OF REMOTE SENSING AND GEO-SPATIAL TECHNIQUES**

(KANDI SAI KIRAN)

TIME :3 Hrs

Max Marks:100

Answer all questions. Each question carries 20 Marks.

1. Give a detail note on Occurrence and movement of groundwater?

O r

2. Describe aquifers and list out types of aquifers?

3. Define the Darcy's law and discuss the applications of Darcy's laws?

O r

4. Write about various types of wells and discuss methods of drilling for groundwater Development?

5. Describe Fluvial processes -Fluvial landforms?

O r

6. Describe physical and chemical properties of ground water?

7. Describe Sea water intrusion and its controlling factors?


O r

8. Effects of urbanization on groundwater quality, Sustainability of water quantity and quality within the urban water cycle?

9. Discuss the application of Remote sensing and GIS in Groundwater pollution zones identification?

O r

10. Describe Groundwater problems in coastal zones and delta areas?


Dr. K. NOOKA RATNAM
Research Supervisor
Department of Geosciences
ADIKAVI NANNAYA UNIVERSITY
RAJAMAHENDRAVARAM-533 206.

ADIKAVI NANNAYA UNIVERSITY: RAJAHMUNDRY
DEPARTMENT OF GEOSCIENCES
Pre-Ph.D Examination-2022
Syllabus

Paper-II: Multi-hazard risk, Bio-geomorphologic, Environmental Sustainability and Social Vulnerability Assessment of Godavari River delta region and Costal front- Remote sensing and Geospatial Information System Modelling Perspective

(Tharapatla Purushotam)

UNIT 1: Geo-environmental hazards, causes and effects of volcanoes, earthquakes, floods, droughts, landslides and coastal hazards, land desertification, degradation and management. Causes and management of soil erosion, greenhouse effect, global warming and their impact on earth systems -biosphere, hydrosphere and atmosphere, environmental sustainability assessment.

UNIT 2: Concept of disaster management, disaster management cycle- prevention – mitigation – preparedness – response – recovery. Management of disasters like cyclone – drought – floods – coastal erosion – tsunami. Shoreline change assessment and occurrence of various disasters in Godavari delta. Vulnerability – social, economic and physical vulnerability assessment.

UNIT 3: Geomorphology and landforms: fluvial, aeolian glacial and coastal processes, fluvial process of Godavari River and drainage system, classification of deltas, type of Godavari delta, landforms associated with Godavari delta and geotectonic settings of Godavari delta.

UNIT 4: Origin of ground water, various hydrological properties of rocks, Darcy's law, types of aquifers – confined, unconfined, perched aquifers, natural and artificial recharge of ground water, water table and groundwater table fluctuations – occurrence and of ground water in Godavari delta regions.

UNIT 5: Application of remote sensing and geographic information system in disaster management, Image classification and change detection studies. Various GIS supported systems for disaster management, Analytical hierarchy process and frequency ratio method's role in multi hazard risk assessment.

Text books:

1. Thornbury, WS, Principles of geomorphology, willey eastern, New Delhi.
2. K.S. Valdiya, Environmental geology, McGraw-Hill Education – Europe.
3. Edward A . Keller, Environmental geology.
4. H.D Rangunath, text book of hydrogeology.
5. Geoinformatics for environmental management by M. Anji Reddy, BS publications.

K. Ratnam

Dr. K. NOOKA RATNAM
Research Supervisor
Department of Geosciences
ADIKAVI NANNAYA UNIVERSITY
RAJAHMUNDRY-533 296.

ADIKAVI NANNAYA UNIVERSITY: RAJAHMUNDRY
DEPARTMENT OF GEOSCIENCES

Pre-Ph.D Examination-2022

Model Question Paper

Paper-II: Multi-hazard risk, Bio-geomorphologic, Environmental Sustainability and Social Vulnerability Assessment of Godavari River delta region and Costal front- Remote sensing and Geospatial Information System Modelling Perspective

(TharapatlaPurushotam)

Time: 3Hrs

Max Marks:100

Answer all questions. Each question carries 20 Marks.

1. Describe causes and effects of various natural hazards?

(Or)

2. Define sustainability and briefly explain environmental sustainability assessment?

3. Write an essay on disaster management cycle?

(Or)

4. Write a short note on vulnerability and explain social, economic and physical vulnerability assessment?

5. Briefly explain landforms associated with fluvial process?

(Or)

6. Write an essay on landforms associated with coastal process?

7. Describe various natural and artificial ground water techniques?

(Or)

8. Define water table and explain causes of water table fluctuations?

9. Write a brief note on applications of remote sensing and GIS in disaster management?

(Or)

10. Explain classification of remote sensing image classification?



Dr. K. NOOKA RATNAM
Research Supervisor
Department of Geosciences
ADIKAVI NANNAYA UNIVERSITY
RAJAMAHENDRAVARAM-533 296.

ADIKAVI NANNAYA UNIVERSITY:: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY
Pre-PhD course work syllabus:: 2022
(Area of Research and methodology)

Paper-II: Groundwater studies at hydrocarbons seepage areas and at development activity areas (G Uma Mahesh)

Unit 1: Groundwater: Occurrence and movement of groundwater, types of aquifers, groundwater levels, Types of wells – Methods of artificial groundwater recharge, Site selection criteria for artificial recharge - Groundwater assessment and management methods – Seawater intrusion in coastal aquifers – Land subsidence – Optimal groundwater development – Indian GEC norms.

Unit 2: Aquifer parameters: Determining aquifer parameters for unconfined, leaky and non-leaky aquifers – Determination of well characteristics and specific capacity of wells – Investigation and evaluation of Groundwater: geophysical methods – Electrical Resistivity method – GPR techniques – surveying procedure and Interpretation of data – Subsurface investigations – Test drilling – Resistivity logging.

Unit 3: Fluvial geomorphology: Fluvial processes – Fluvial landforms – types – evolution of fluvial landforms. Morphometric analysis of Drainage pattern - Watershed delineation and codification – watershed characteristics – linear, aerial and relief aspects and slope analysis. Groundwater Quality assessment – Quality of groundwater for agriculture, drinking and industrial purposes -.Groundwater pollution.

Unit 4: Water resources in East and West Godavari districts: Godavari river basin and its tributaries – Rainfall distribution and run-off, Geology and Structure and geomorphological landforms in Godavari districts of Andhra Pradesh, Status of Groundwater resources in Godavari districts. Delta areas of India and special emphasis on Godavari and Krishna delta area.

Unit 5: Applications of Remote Sensing and GIS for identification of groundwater potential zones, pollution zones, Paleo-channels and hydrocarbon seepage zones. Groundwater problems in coastal zones and delta areas. Detecting methods for hydrocarbon seepage zones. Application of geophysical, geochemical, sedimentological and isotope techniques for identification of hydrocarbon seepages and paleo-channels.

Text books:

1. P.S.Roy, R.S.Divedi and D.Vijayan (2010), Remote sensing applications, NRSC, Hyderabad
2. Chow V.T., Maidment D.R., Mays L.W., (1995): Applied Hydrology, Mc Graw Hill publ.
3. Ragunath H.M., (1994): Hydrology, Wiley Eastern Ltd., New Delhi, 1994.
4. Ven Te Chow, Hand book of Hydrology, McGraw Hill Publications, New York, 1995.
5. Groundwater geophysics – A tool for hydrogeology, Reinhard Kirsch, Springer verlag, 2006
6. Andreas Laake (2022): Remote sensing for hydrocarbon exploration, Springer publisher
7. Treatise of petroleum geology/Handbook of Petroleum Geology (1999): Exploring for oil and gas traps, Edited by Edward A. Beaumont and Norman H. Foster, Chapter 18:Surface geochemical exploration, by Dietmar schumachere, 18-1 to 18-27pp.



Model Question Paper

ADIKAVI NANNAYA UNIVERSITY:: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY
Pre-PhD Examination::2022

Paper-II: Groundwater studies at hydrocarbons seepage areas and at development activity areas (G Uma Mahesh)

Time: 3Hrs

Max. Marks: 100

Answer all the questions

1. Give a detail note on Occurrence and movement of groundwater ?
OR
2. Discuss the seawater intrusion in coastal zones ?
3. Explain the aquifer parameters determination methods for various aquifers ?
OR
4. Explain the groundwater exploration techniques ?
5. Discuss the fluvial processes and fluvial landforms ?
OR
6. Give a detail note on morphometric analysis of drainage pattern in a river basin ?
7. Discuss the rainfall distribution and run-off conditions in Godavari districts of Andhra Pradesh
OR
8. Explain the Geomorphology of Godavari districts, Andhra Pradesh ?
9. Discuss the application of RS and GIS in Groundwater pollution zones identification?
OR
10. Give a detail note on groundwater problems in coastal and delta areas ?



(K. Sanjanya)

Syllabus

Paper I: Recent Advances in the concerned discipline (Gas hydrates and energy resources)

Unit I: Conventional and Unconventional Hydrocarbon Energy sources Heavy and extra-heavy oil, tight gas reservoirs, CBM, Shale gas and Gas Hydrates and its importance in the present scenario over conventional energy resources, present technical constraints in the direct use of gas hydrates.

Unit II: What are gas hydrates? Formation and stability conditions of gas hydrates, Types of Hydrate structures: Type I hydrates- Type II hydrates- Size of the guest molecules, Type H hydrates, Hydrate forming conditions- Pressure-Temperature- Composition-Other hydrate formers.

Unit III: Applications of gas hydrates, Formation of hydrate plugs and flow assurance, safety, Exploitation of natural gas hydrate reserves and energy recovery, gas storage/transportation, CO₂ sequestration and climate change.

Unit IV: Scope and necessity of laboratory Studies-Hydrates as a laboratory curiosity, Hydrate formation and dissociation process in the laboratory, Hindrance in synthesis of gas hydrates in laboratory, LNG, CNG, SNG technologies

Unit V: Gas hydrates Indian & Global scenario, Estimates of hydrate reserves, hydrates as future energy source, problems involved in its exploitation, storage and transportation- Gas hydrates and scope for socio economic development of the Nation

K. Sanjanya
Convener,
BOS in Geophysics

Model Question Paper

Paper I

Recent Advances in the concerned discipline

(Gas hydrates and energy resources)

Time 3 hours:

Marks 100

Note: Answer all the questions

All questions carry equal Marks

Each Question carry 20 marks

- 1) What are different conventional and non-conventional sources of energy?

OR

What are gas hydrates? Give an account of its characteristics.

- 2) Discuss in detail about the formation conditions and stability of gas hydrates

OR

Give an account of different types of gas hydrates structures?

- 3) Give in detail the applications of gas hydrates?

OR

Discuss in detail about exploitation of natural gas hydrates, formation of hydrate plugs and flow assurance.

- 4) Describe LNG, CNG, SNG technologies for storage and transportation of natural gas.

OR

Write a detailed discussion of formation and dissociation process of gas hydrates in laboratory.

- 5) Discuss in detail- "Gas hydrates- Indian and global scenario"

OR

Discuss about the possible socio economic development of India"



Syllabus : K. Sanjaya

Paper-II

Special topic concerned with thesis including Research methodology (Gas hydrate synthesis and research methodology)

Unit I: Laboratory studies of gas hydrates, Isochoric and isobaric experimental setup, safety measures, Hydrate Nucleation, crystal growth and Dissociation, Formation and dissociation behaviour, Phase equilibrium calculations, Ideal gas law, Phase diagrams, the memory effect phenomenon, Anamolous self-preservation effect.

Unit II: Thermodynamics of gas hydrates, Kinetics of gas hydrates, the role of additives in hydrate formations, different types of additives to be used in hydrate formation, different chemicals as hydrate promoters/inhibitors, The clausius-clapeyron equation and hydrate equilibrium, Hydration number.

Unit III: Necessity of characterization, Usage of experimental apparatus and state of the art instrumentation, Differential scanning Calorimeter (DSC), SEM, XRF, XRD, Raman & FTIR Spectrometers investigating various macroscopic (Optical, electrical, mechanical, magnetic, etc.) and microscopic properties (Chemical structure, composition, surface characterization, etc.), Probing bulk structures using characterization tools like XRD, Microstructures Using Raman, FTIR, Study of phase changes, crystalline and amorphous fractions using DSC.

Unit IV: Scientific Research: Definition, Characteristics, Types, need of research. Identification of the problem, assessing the status of the problem, formulating the objectives, preparing design (experimental or otherwise), Actual investigation, determining the mode of attack, Research ethics – ethical issues, ethical committees; Publication Ethics, Scholarly, publishing – concept, and design of research paper, - codes and policies of research ethics- citation and acknowledgment, plagiarism, reproducibility, and accountability.

Unit V: Documentation and scientific writing: Types of Report: research papers, thesis, Research Project Reports, Pictures and Graphs, citation styles, writing a review of paper, Bibliography. Preparation of manuscript for Publication of Research paper, presenting a paper in scientific seminar, Thesis writing. Structure and Components of Research Report.

K. Sanjaya
Convener,
BOS in Geophysics

Model Question Paper
Paper-II
Special topic concerned with thesis including Research methodology
(Gas hydrate synthesis and research methodology)

Time 3 hours:

Marks 100

Note: Answer all the questions
All questions carry equal Marks
Each Question carry 20 marks

- 1) Discuss in detail about the laboratory synthesis of gas hydrates- isochoric and isobaric experimental setup.

OR

Give an account of formation and dissociation of gas hydrates?

- 2) What are the different materials/processes used to promote the hydrate formation?

OR

Write in detail about the determination of hydration number from the Clausius-Clapeyron equation.

- 3) Discuss about the principle and working of XRD.

OR

What is Raman spectroscopy? What information can be derived from the Raman spectroscopic study?

- 4) Write in detail about the scientific research and its characteristics.

OR

Discuss ethical issues in research and publication ethics.

- 5) How to write a research proposal and research paper?

OR

Write in brief about different types of research reports and their components.



ADIKAVI NANNAYA UNIVERSITY: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY

Syllabuses for the Ph.D. course work in Geophysics

✓ (Mr. Maripireddi. Ashok, JRF, ISR, Gandhinagar)

PAPER – II: Broad Area of Research Topic (Seismic Anisotropy Studies Using BBS)

Unit-I: Physical properties of rocks and minerals and their analysis. Mechanical (density, elastic, including wave velocities

- Electrical (conductivity/resistivity, dielectric constant)
- Magnetic (Permeability, susceptibility Remanence)
- Hydraulic (Porosity, Permeability, retention and yield)
- Radioactive & Geothermal methods
- Well logging methods (Determination of porosity, permeability, formation factor and density)
- The earth's gravity field, the force of gravity on the surface of the earth, the figure of the earth, Clairaut's theorem, the geometric and gravitational flattening, International gravity formula, geoid and spheroid, the gravity potential; Isostasy and models of isostasy, isostatic compensation and vertical crustal movements.

References:

1. Telford WM and others (1976) – Applied Geophysics – Cambridge Univ. Press.
2. Dobrin, M.B. (1976) – Introduction to Geophysical prospecting – Mc Graw Hill

Unit-II: Concepts of plate tectonics: The lithosphere, lithospheric plates, distribution of major and minor lithospheric plates, types of plate margins – constructive, destructive and conservative plate margins, triple junctions their evolution and stability, forces acting on lithospheric plates, relative magnitudes of forces driving plate motions; mantle viscosity, concepts of mantle convection models, coupling between plates and mantle convection.

References:

1. Book of Plate Tectonics - Pichon
2. Fundamentals of Geophysics, William Lowrie

Unit-III: Introduction to seismology. Elastic waves- Elastic, Anelastic and Plastic behaviour of materials. Stress, Strain, elastic constants. Seismic waves- Introduction, Body waves. Surface Waves, Types and Phases of waves. Free oscillations of the Earth, the internal Structure of the Earth- Refraction and Reflection in the earth's interior. Types of Earthquakes. Crustal deformation and strain, slip rate,

References:

1. Fundamentals of Geophysics, William Lowrie

Unit-IV: The earth's interior – The internal constitution of earth, the . . Structure of the earth based on Geophysical parameters. Vertical and lateral inhomogeneity's in the earth's crust and mantle. Geodynamics of the Indian sub-continent. Seismic Anisotropy: 1. Definition and parameters 2. The acoustic anisotropic wave equation. 3. Fundamental issues.

References:

1. Stein, S. and M. Wyssession, (2003). An Introduction to Seismology, Earthquakes, and Earth Structure, Blackwell Publishing.
2. Gubbins, D. (2004). Time Series Analysis and Inverse Theory for Geophysicists, Cambridge University Press.

W. S. F.
Governor
BOS in Geophysics

3. Kramer, S.L., (1996). Geotechnical Earthquake Engineering, Prentice Hall.
4. Shearer, P. M. (2011). Introduction to Seismology, 2nd edition. Cambridge.

Unit-V: Study area: Introduction of Kachchh towards the western India and its active faults and more detail about the Katrol Hill Fault (KHF), Basic Geology, Structure and Tectonics of Kachchh with special emphasis on KHF, Fault Systems, and Seismo-tectonics of the study area. Anisotropy observation along active faults in Kachchh region, regions for anisotropy for crust, mantle & core mantle boundary Kachchh .

References:

1. Tectonics Framework, Structure and Tectonic Evolution of Kutch Basin, Western India by S.K.Biswas.
2. Implications of transverse fault system on tectonic evolution of Mainland Kachchh, western India by D.M.Maurya.
3. Active fault traces along Bhuj Fault and Katrol hill fault, and trenching survey at Wandhay, Kachchh, Gujarat, India by Michio Morino.

M. S. Biswas
7.
Convener
BOS in Geophysics

M. S. Biswas
2023/05/20

ADIKAVI NANNAYA UNIVERSITY: RAJAHMUNDRY
DEPARTMENT OF GEOLOGY

Model Question paper for Pre-Ph.D Exam in Geophysics: Paper II
(Mr. M.ASHOK, JRF, ISR, Gandhinagar)

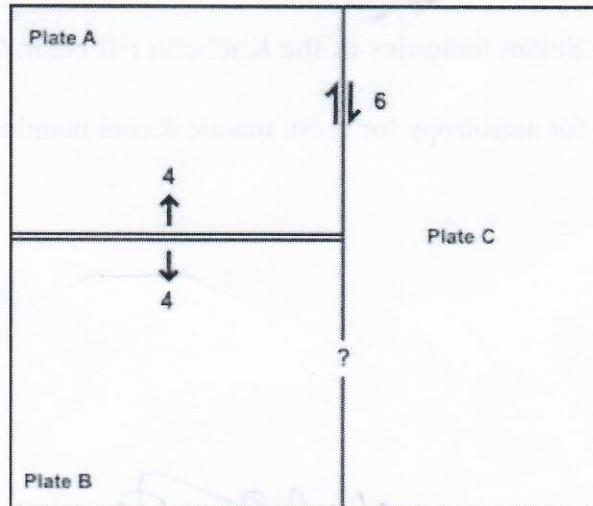
Unit-I

1. Explain the below properties of rocks and minerals in detailed?
 - a. Electrical properties
 - b. Mechanical properties
2. What is Clairaut's Theorem? Briefly explain the difference between the Geoid and Spheroid with neat sketches?
3. What is Isostasy and explain the airy and Pratt's isostasy with neat diagrams?

Unit-II

1. Explain Plate tectonics and different types of plate margins with diagrams?
2. What is triple junction? The below figure shows the triple junction between three plates A, B and C. The boundary between the plates A and B is a ridge with a half spreading rate of 4 cm/year. The A-C and B-C boundaries are collinear and orthogonal to the A-B ridge. The A-C boundary is a dextral transform fault with a relative velocity of 6 cm/year. Identify the boundary between plates B and C and velocity of the plate motion?

SS



3. Explain Mantle viscosity and concept of mantle convection models?

Unit-III

1. Explain Elastic, Plastic, Visco-elastic deformations and derive the equation for Visco-elastic model?
2. Briefly Explain Seismic waves (Body waves and Surface waves) and Wadati diagram? Draw a sketch and describe the relation between deformation, earthquake and fault?
3. Write the Discontinuities of the Earth's subsurface and explains the behaviour of different types of seismic Phases from an earthquake with focus at the Earth's surface with diametrically?

Unit-IV

1. Explain in detailed about the structure of the earth based on different geophysical parameters?
2. Write about the vertical and lateral inhomogenities in the earth's crust and mantle?
3. Define Seismic anisotropy and derive the acoustic anisotropic wave equation?

Unit-V

1. Explain the formation of Kachchh rift basin and different fault systems along the Kachchh?
2. Briefly explain the Seism tectonics of the Kachchh rift basin?
3. what is the reasons for anisotropy for crust, mantle & core mantle boundary beneath Kachchh region .

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ADIKAVI NANNAYA UNIVERSITY
Department of Geosciences
Pre-Ph.D. Course work Syllabus (Mrs. Gunda Swathi)
Paper-II: Groundwater Resource Management Studies
(Common with Ms. K. Maneesha)

Unit I:

General Concepts: Hydrological cycle and Origin of water, vertical distribution of groundwater. Water balance equation and its components, analysis of Hydrograph, Concept of basin. Deciphering of hydro-geological boundaries on water table contour maps. Types of aquifers, springs, Hydrogeological properties of water bearing materials &. Groundwater level and its fluctuations, water table contour maps, classification of rocks with respect to their water bearing characteristics.

Unit II:

Well Technology: Darcy law and its applications. Well types, drilling methods, construction design, development and maintenance of wells, Pump tests-methods, data analysis and interpretation

Ground water exploration, geophysical methods - geo-electrical methods; Electrical resistivity surveys for aquifer delineation.

Unit III:

Water Quality: Quality of Ground Water: Physical, Chemical and Biological characteristics of groundwater. Suitability of groundwater for drinking, Irrigation and industrial purposes. Pollution of Ground Water; Pollution in relation to urban, industrial and Agricultural sources. Graphical presentation of water quality data including Trilinear (Hill-Piper), C-S diagrams etc. Calculation of salt water encroachment in coastal aquifers. Groundwater pollution, Quality Problems in India.

Unit IV

Groundwater Management: Problem of overexploitation, Water balance studies with application of Indian GEC norms. Water management in rural and urban areas; Artificial recharge of water-recharging by surface water and rain water harvesting. Consumptive and conjunctive use of surface and ground water. Application of hydrological software.

Unit V

Ground Water Sustainability: Ground water sustainability indicators. The Conceptual approach for Groundwater indicators. The social and economic aspects for ground water indicators. Future development of ground water indicators. Case Studies: Method of calculation of the renewable GW resources per capital indicator, Ground Water sustainability indicators testing with Finish data and implementation of Ground Water indicators in India.

Books Recommended:

- Todd, D.K. (1988): Ground Water Hydrology, John Wiley & Sons, New York
- Davies, S.N. and De-West, R.J.N. (1966): Hydrogeology, John Wiley & Sons, New York
- Ground Water and Wells (1977): UOP, Johnson, Div. St. Paul. Min. USA
- Hiscock, K.M. and Bense, V.F., 2014. Hydrogeology: Principles and Practice 2nd Edition, Wiley-Blackwell
- Raghunath, H.M. (1983): Ground Water, Wiley Eastern Ltd., Calcutta
- Driscoll, F.G. (1988): Ground Water and Wells, UOP, Johnson Div. St. Paul. Min. USA

M. Swathi
Convener, BOS in Geophysics

- Fetter, C.W., 1984. Applied Hydrogeology, McGraw-Hill Book Co., New York
- Karanth K.R., 1987. Groundwater: Assessment, Development and Management, Tata McGraw-Hill Pub. Co. Ltd.
- Schward and Zhang, 2003. Fundamentals of Groundwater, John Willey and Sons
- Freeze, R.A. and Cherry, J.A., 1979. Groundwater, Englewood Cliffs, New Jersey: Prentice-Hall
- Garg, S. P.,: Ground water and Tube wells
- Walston, W. C.,: Ground water resource evaluation

Model Question Paper
ADIKAVI NANNAYA UNIVERSITY
Department of Geosciences
Pre-Ph.D. Course
Paper-II: Groundwater Resource Management Studies

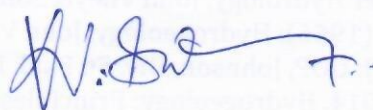
Time: 3 Hrs

Max. Marks: 100

Answer all questions

20 x 5 = 100 m

1. Explain in detail about occurrence and movement of Groundwater
OR
2. Explain the Hydrogeological properties of water bearing materials
3. Discuss the Darcy's law and its application
OR
4. Write an essay on Electrical Resistivity in exploration of Groundwater resources
5. Write an essay on Groundwater quality studies
OR
6. Discuss the seawater intrusion in coastal zones
7. Give a detail note on Groundwater Overexploitation
OR
8. Explain the methodology used in identification of suitable sites for rainwater harvesting structures
9. Discuss the usage of sustainable indicators in groundwater studies
OR
10. How the sustainability indicators have been used for testing the groundwater resources using Finish data?





Adikavi Nannaya University
Department of Geo-Sciences
Pre-Ph.D. Course work Syllabus (Mr. B. D. N. Kishore)

Paper II: Structure and tectonics of EGMB in some Coastal districts of Andhra Pradesh:
A geophysical and remote sensing approach

Unit 1:

Eastern Ghat Mobile Belt (EGMB): Geological evolution – relation with Southern Granulite Terrain (SGT), Zonation in EGMB, stratigraphy, major rock associations, evaluation of EGMB; Extensions - tectonic divisions within EGMB, extensions and limits of EGMB in India and outside India.

Unit 2:

Regional tectonic frame work of EGMB – shear zones in EGMB, magmatism in shear zones of EGMB; Geomorphology of EGMB – controls of geomorphic evolution, evolution of geomorphology of EGMB, river system in EGMB, geomorphology of the coastal plains.

Unit 3:

Passive continental margins of India (ECMI) – characteristics, Evolution of ECMI, two stage evolution of ECMI, linkup with Gondwanaland Break-up, ambiguities in the proposed theories on the evolution of ECMI, summary of structural lineaments over the ECMI, land-ocean tectonic lineaments/signatures of the K-G basin, seismic hazards over the ECMI.

Unit 4:

Application of multispectral remote sensing in structural mapping and Neotectonism; lineaments – Definition and terminology, scale and manifestation, mapping of lineaments, visual vs. digital interpretation, statistical analysis, genetic types of lineaments and discrimination between them, scope of lineament studies; Neotectonism-Definition, Evidences for neotectonic movements, seismic hazards and disaster assessment.

Unit 5:

Concepts of modeling and inversion of gravity and magnetic anomalies, modeling and inversion of gravity anomalies of density interfaces, modeling and inversion of magnetic anomalies of magnetic interfaces, inversion of gravity anomalies of faults and sheets, inversion of magnetic anomalies dykes and sheets, role and application of gravity, magnetic, seismic, electrical and MT techniques in exploration of EGMB, ECMI and East coast basins based on earlier research works.

References

1. Proceedings of workshop on Eastern Ghats Mobile Belt, Geological Survey of India Special Publication 44, 1998.
2. K. S. R, Murthy et.al., 2012, Tectonics of the Eastern Continental Margin of India, The Energy and Research Institute (TERI), New Delhi, India.
3. I. V. R. Murthy, 1998, Gravity and Magnetic Interpretation in Exploration Geophysics, Geological Society of India, Bangalore, India.

B. D. N. Kishore
Convener
BOS in Geophysics

Model Question Paper
ADIKAVI NANNAYA UNIVERSITY
Department of Geo-Sciences
Model Question Paper

Paper II: Structure and tectonics of EGMB in some Coastal districts of Andhra Pradesh:
A geophysical and remote sensing approach

Time: 3Hrs

Max. Marks: 100

Answer all questions.

1. Write in detail about the geological evolution of the Eastern Ghat Mobile Belt and its relation with Southern Granulite Terrain.

OR

2. Write an essay about the tectonic divisions within EGMB and limits of EGMB in India.

3. Write in detail about the shear zones in EGNB and magmatism in shear zones of EGMB.

OR

4. Describe about the evolution of geomorphology of EGMB and geomorphology of coastal plains in EGMB.

5. Write on any two of the following. Each question carries 10 marks.

a) Characteristics of passive margins of India.

b) Two stage evolution of ECMI

c) Seismic hazards over the ECMI.

d) Linkage of ECMI with Gondwanaland break-up

6. What is meant by neotectonism? Write about the role of multispectral remote sensing in structural mapping and neotectonism.

OR

7. Define a lineament. Describe different genetic types of lineaments and discrimination between them.

8. Write in detail about the concepts of modeling and inversion of gravity and magnetic anomalies.

OR

9. Write down the magnetic anomaly equation of dykes. Write down the inversion of magnetic anomalies due to a dyke model.



Government College (Autonomous), Rajahmundry

(Affiliated to AdikaviNannaya University)

Department of Geology

Pre-Ph.D. Course work Syllabus 2021

Paper-II : Groundwater Resource Management Studies (K. Maneesha)

Research Topic: *Groundwater Resource Management studies in Crystalline and Gondwana Formations in upland tract of West Godavari District, Andhra Pradesh*

Unit I:

General Concepts: Hydrological cycle and Origin of water, vertical distribution of groundwater. Water balance equation and its components, analysis of Hydrograph, Concept of basin. Deciphering of hydro-geological boundaries on water table contour maps. Types of aquifers, springs, Hydrogeological properties of water bearing materials &. Groundwater level and its fluctuations, water table contour maps, classification of rocks with respect to their water bearing characteristics.

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Well Technology: Darcy law and its applications. Well types, drilling methods, construction design, development and maintenance of wells, Pump tests-methods, data analysis and interpretation

Ground water exploration, geophysical methods - geo-electrical methods; Electrical resistivity surveys for aquifer delineation.

Unit III:

Water Quality: Quality of Ground Water: Physical, Chemical and Biological characteristics of groundwater. Suitability of groundwater for drinking, Irrigation and industrial purposes. Pollution of Ground Water; Pollution in relation to urban, industrial and Agricultural sources. Graphical presentation of water quality data including Trilinear (Hill-Piper), C-S diagrams etc. Calculation of salt water encroachment in coastal aquifers. Groundwater pollution, Quality Problems in India.

Unit IV

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Unit V

Ground Water Sustainability: Ground water sustainability indicators. The Conceptual approach for Groundwater indicators. The social and economic aspects for ground water indicators. Future development of ground water indicators. Case Studies: Method of calculation of the renewable GW resources per capital indicator, Ground Water sustainability indicators testing with Finish data and implementation of Ground Water indicators in India.

K. Maneesha
Coordinator, BOS in Geophysics
Dept. of Geo-Sciences, AKNU

Books Recommended:

- Todd, D.K. (1988): Ground Water Hydrology, John Wiley & Sons, New York
- Davies, S.N. and De-West, R.J.N. (1966): Hydrogeology, John Wiley & Sons, New York
- Ground Water and Wells (1977): UOP, Johnson, Div. St. Paul. Min. USA
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- Walston, W. C.,: Ground water resource evaluation
- Garg, S. P.,: Ground water and Tube wells



Model Question Paper

Government College (Autonomous College), Rajahmundry
Department of Geology
Pre-Ph.D. Course work Syllabus 2021
Paper-II : Groundwater Resource Management Studies (K. Maneesha)

Time: 3 Hrs

Max. Marks: 100

Answer all the questions

20 x 5 = 100 m

1. Explain in detail about occurrence and movement of Groundwater
or
2. Explain the Hydrogeological properties of water bearing materials
3. Discuss the Darcy's law and its application
or
4. Write an essay on Electrical Resistivity in exploration of Groundwater resources
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9. Discuss the usage of sustainable indicators in groundwater studies
or
10. How the sustainability indicators have been used for testing the groundwater resources using Finish data?

